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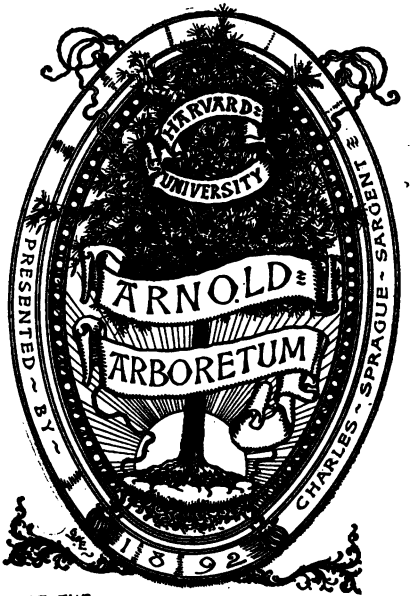

DEPOSITED AT THE
HARVARD FOREST
1941

THE CULTURE OF FORESTS.

#

THE CULTURE OF FORESTS;

WITH

AN APPENDIX,

IN WHICH

THE STATE OF THE ROYAL FORESTS IS CONSIDERED,

AND

A SYSTEM PROPOSED FOR THEIR IMPROVEMENT.

BY

LIEUT. COL. A. EMMERICH,

Deputy Surveyor General of the Royal Forests, Chaces, and Parks.

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M DCC LXXXIX.

PREFACE.

HAVING formerly been employed by his late Pruſſian Majeſty, as Foreſt Maſter and Manager of his Foreſts in Weſtphalia, and obtained the rank of Counſellor at War, in His Majeſty's Chamber of War and Domain at Minden; upon leaving His Pruſſian Majeſty's ſervice, I had the honour of being ap-

pointed to the ſimilar office in this country, in the year 1775, by Lord North, then Prime Miniſter of Great Britain. The indiſpoſition of the Surveyor General, the late Mr. John Pitt, Lord North's vacating his place as Prime Miniſter, together with the American war and other cauſes, have ſince that period interrupted that attention to the ſtate and improvement of the Royal Foreſts, which it was the zealous wiſh and deſire of his Lordſhip to have paid, and the plan for which he had long been ſecretly maturing in his own breaſt.

During

During the preſent peaceable moments to the army of Great Britain, in which I had the honour of ſerving in the laſt German war, from the rank of Subaltern to that of Captain, and in the late American war, in the rank of Lieutenant Colonel Commandant of a corps of light troops, it is with great pleaſure, therefore, I have found leiſure to direct my efforts to the more particular diſcharge of the duty of my office, which the ſervice I was engaged in, and the circumſtances before mentioned, have hitherto prevented.

In this view I have endeavoured, in the following pages, to lay down from my own practice and experience, the rules which appear, firſt, neceſſary to be obſerved in the formation and management of foreſts in general, commencing with the ſeed, and after conducting the foreſt to its full growth, ſhewing the method of continuing it in preſervation. Secondly, I have conſidered the ſtate of the Royal Foreſts, Chaces, and Parks, and propoſed a ſyſtem for recovering them from their preſent waſte and ruin.

The

The culture of the Oak and Fir, in particular, is an object whoſe magnitude and importance muſt ſtrike every individual: as a ſource of encreaſe to the national wealth and ſtrength of this country, none ſeems likely, if juſtly cheriſhed, to prove more liberal.

If the following treatiſe, therefore, ſhould be the means of turning the attention of the Legiſlature to the production of a new and very conſiderable revenue to the Crown, from lands which at preſent lie waſte and uncultivated

through

through the iſland, ſome of them affording nothing but a barren proſpect to the eye, I ſhall be happy in having ſo far ſubminiſtered to that view; but if it ſhould only be accepted by thoſe who are pleaſed to place confidence in my ſervices, as a teſtimony of my uſing my utmoſt exertions to deſerve it, it will greatly relieve my labours, and encourage my hopes of proving uſeful, by perſeverance in them.

Being a Foreigner by birth, tho' ſince naturalized, I have been aſſiſted in the Engliſh ſtile by Mr.

Mr. Charles Cullen, a gentleman whoſe learning and abilities made the taſk I undertook both eaſy and agreeable, and to whom I beg leave to take this opportunity of returning my beſt thanks.

St. James's Park,
Feb. 16, 1789.

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THE

THE

CULTURE OF FORESTS,

&c. &c. &c.

CHAP. I.

A FOREST is a tract of land overſpread with woods of wild growth. As their value is different, the beſt have been ſelected, and their propagation by nature aſſiſted and encreaſed by art. The principles and practice which have been adopted for that purpoſe, and approved by experience, is the ſubject we explain: we ſhall begin with the culture of the Oak; it being the principal among the foreſt trees.

Of

Of the Oak in general; its different Species, Character and Deſcription.

The Oak is ſo noble a tree, that every perſon is acquainted with its name and value. There are two principal ſpecies of Oak; one of which is called the Stone Oak, the other the Red Oak. They are both large in the body as well as in the branches. Their roots, and particularly the heart-root, run deep and perpendicularly in the ground, and are proportioned in ſize to the ample nouriſhment they have to convey. The growth of the Oak is extremely ſlow, but as it grows ſlowly, it ſtands long. Some authors ſay that it grows for an hundred years, ſtands for an hundred years, and is an hundred years in decaying. This tree has a great quantity of ſap, on which account, its big bark is liable to be affected by froſts, which, in cold winters, make it often crack and open: at the ſame time it ſuffers much in its buds, by the later froſts

and

and blights of the ſpring; which is the reaſon, not only of the Oak being the laſt of all trees in ſhewing its leaves, but alſo of its not producing acorns every year. If in the month of July, at which ſeaſon the fruit generally begins to form, any fogs happen to fall, the fruit is inſtantly ſpoiled, and a ſmall worm is found in the young acorn, which entirely deſtroys it.

The chief diſtinction between theſe two kinds of Oak, is, that the timber of the Stone Oak is whiter and rather harder than that of the Red Oak, which is of a reddiſh colour. The leaves of the Stone Oak are alſo ſmaller and of a darker green than thoſe of the Red.

This noble tree, though of delicate growth, is moſt ſucceſsfully produced from the ſeed or acorn; though it bears to be tranſplanted, as ſhall more fully be explained hereafter. The Oak which is tranſplanted, never attains ſo great a height as the tree from the acorn; but ſpreads itſelf horizontally, and runs into branches. We

have ſeen, in a great foreſt of Germany, near Minden, on the Weſer, an Oak tree, the ſtem of which meaſured fifty-five feet clear of branches, and the diameter of the baſe four feet and a half. This tree was ſo aged, that no old perſon remembered to have ſeen it in leaf; it was perfectly dry, the bark was fallen off, and the timber was entirely decayed to the depth of one inch and a half all round the ſtem, but notwithſtanding upon being cut, the heart was found white, ſound, and hard like ivory.

The other ſpecies, or perhaps varieties of the Oak tree are two in number; we do not find however that they are diſtinguiſhed by name, though they are different in ſome other reſpects from the two firſt. The one bears a ſingle acorn of a large ſize, on a long ſtalk; the other brings two or three ſmaller acorns on a ſhort ſtalk, in a cluſter like filberts. The leaves of the firſt of theſe reſemble thoſe of the Stone Oak; the leaves of the other are round, broad, and of a dark green colour, reſembling

thoſe

thoſe of the cheſnut tree. Both theſe latter ſpecies are more hardy, and ſuſtain leſs injury from froſts than the former; on which account they produce acorns almoſt every year. The acorns of all the four ſpecies become ripe at the ſame ſeaſon of the year, which is in the latter end of the month of September, and in October.

CHAP. II.

Of gathering and preſerving the Oak Seed; of the fitteſt Soil, Seaſon and Methods of preparing and ſowing Land.

Of gathering the Oak Seed.

THE month of October is the proper time for gathering Oak ſeed. The acorns gathered ought to be thoſe of the beſt trees, which after having been fully ripened by the ſun, have dropt of themſelves to the ground. Thoſe which are free of any worm bite, and appear perfectly ſound, muſt be picked out from the reſt. The gathering of them is an office which may give

give ſome relief to the poor by employing them in it.

Of preſerving the Seed.

When the Oak ſeed is gathered, the ſafeſt practice is to ſow it immediately; if no land, however, ſhould be ready prepared for it, the acorns muſt be laid up in a dry loft or chamber, and ſpread upon a wooden floor, but not above two inches deep over each other; and as they begin to ſweat, they ought to be frequently turned with a rake, until they are completely dry, and afterwards covered with ſaw-duſt, that they may be entirely preſerved from being damaged by any froſts, until they are wanted for ſeed in the ſpring.

Of the Soil.

The fitteſt ſoil for ſowing acorns, or planting young Oak trees, is that of a clay mixt with a little ſand or gravel; a chalky ſoil is alſo not unfit, nor any heavy land, provided it is not too poor or too wet; as the oak is a tree that requires full nouriſhment, if a proper growth is expected.

Of the Preparation of Nurſery Land.

For the eſtabliſhment of a nurſery of Oaks, from which young trees are to be taken out and tranſplanted, a ſpot of land muſt be choſen, where the ſoil is proper, namely, a ſort of clay, if it can be had, but in particular, it muſt not be ſtony land, and of about two, three, four, or more acres, in extent.

This

This ground muſt be dug three feet deep before the winter ſets in, and left to purify during that ſeaſon. In the middle of the following ſummer, it muſt be manured with good cow or hogs dung, and ploughed about a foot deep, then harrowed, and afterwards encompaſſed with a ſufficient fence, or ditch, to prevent any kind of cattle or deer from getting in. It muſt be let lay in this ſtate, until the following fall of the year.

Manner of ſowing; and how much Seed to an Acre.

In the latter end of October, or beginning of the month of November, the ripe ſeed, which has been gathered and picked, muſt be ſown, like grain, on the land that has been thus prepared, in the proportion of three buſhels to an acre. The land muſt then be ploughed to the depth of three inches, next thinly overſown with rye, and laſtly, harrowed with

a harrow, the teeth of which ought not to exceed three inches in length.

If this method is duly followed, a nurſery to the extent of about four acres will enable the foreſter to rear, in a ſhort time, a great many thouſand plants. The purpoſe for which the rye is ſown, is to defend the young plants from exceſſive heat, and to keep them always moiſt, in the ſummer; as well as to protect them from the ſeverity of cold, and prevent them from being preſſed down by the ſnow in winter.

OBSERVATION I.

This manner of ſowing the Oak ſeed is only proper for nurſeries, from which young trees are more immediately wanted to be tranſplanted into a foreſt. A certain part of every foreſt, in proportion to its whole extent, ought to be allotted for a nurſery; it being greatly in favour of young trees that the ſoil into which they

are

are tranſplanted is the ſame with that of their nurſery; and often prejudicial to their growth, if they are removed from their nurſery to a ſoil, the air and qualities of which are different; not to mention the trouble and expence of tranſporting them to a diſtance.

OBSERVATION II.

If the ground laid out for ſuch a nurſery cannot be completely prepared for ſowing by the fall of the year, the acorns muſt be preſerved through the winter in the manner before mentioned, and ſown as ſoon as poſſible in the ſpring. Inſtead of rye, buck wheat, or oats, ought then to be thinly ſown over them; it would alſo be of great ſervice, if a large herd of ſheep were penned within the nurſery ground for three or four nights before the acorns are ſown.

Another Method of preparing Land.

As the expences attending the preparation of a tract of land of more than uſual extent, proper for the growth of the Oak, in the manner before mentioned, would be very conſiderable; if twenty, fifty, one hundred, or more acres, are to be ſown, a different procedure is requiſite. If the ſituation of the land makes it arable, it ought to be ploughed in the month of November, when the plough of the farmer is at leiſure, or during the winter if the weather permits, and let lay until April, when it muſt be carefully croſs ploughed, and afterwards well harrowed, and let lay till the next October, when the acorns can be gathered, and are laſtly to be ſown in the following manner:

Method

Method of ſowing.

On every acre of land ought to be ſown one buſhel of acorns, mixt with a quarter of a buſhel of beech ſeed; on every twenty acres of land, one quarter of a pound of Birch ſeed, mixt with one half pound of Aſh ſeed; Oak, Aſh, Beech, and Birch being the trees which are proper for a complete foreſt. The Beech, in particular, is the Oak's protector; for wherever an Oak and a Beech are ſeen ſtanding together, they are both found in a thriving condition.

Benefits from this Method.

This method of ſowing is attended with the following benefit; that the Aſh and Birch, which both grow quick, and are at an early ſeaſon uſeful for various purpoſes, will

will in a ſhort period of years repay the whole expence of the preparation and ſowing of ſuch a tract of land. It is neceſſary alſo to ſurround the land with a proper fence for a certain number of years, in order to ſecure it from the inroads of any kind of cattle or deer; and care muſt be taken likewiſe to remove at firſt any old trees that may be ſtanding upon it, otherwiſe they will not only hinder the growth of the young trees, but do them great damage when they are taken out, as they muſt be afterwards, particularly if they are full of branches.

OBSERVATION III.

It muſt be obſerved, and particularly attended to, that on account of the Birch ſeed being exceedingly ſmall, and the Aſh ſeed being exceedingly light, it is neceſſary to ſow them in ſtill and rainy weather. The beſt method is to mix both

ſeeds

ſeeds with moiſt ſand in a meaſure; by which means, they fall readily to the ground, from the weight of the particles of ſand which adhere to them, and are more regularly ſown. If the ground is wet with rain, they ſtick to it ſufficiently to take root, without requiring the aſſiſtance of the harrow to cover them.

Another Method of ſowing the Acorn.

A more eaſy, expeditious, and leſs expenſive method of ſowing the Oak ſeed, is by making uſe of the ſetting-tool which farmers and gardeners uſe, called the dibble. The part of this dibble which is to make a hole in the earth, ought not to exceed four inches in length, and ought to be furniſhed with ſome ſharp points or knobs on each ſide, in the manner of a fiſh-hook, or rather the beard of a harpoon, ſo as that when the dibble is raiſed with the hand, ſome of the earth looſened

by

by theſe points, or hooks, may fall to the bottom of the hole, and form a bed proper for the reception of the acorn. On every acre, according to this method, about a buſhel and a half of acorns may be ſown, much in the ſame manner as farmers ſow beans, with which half a buſhel of beech ſeed may be mixed, but ſown in ſeparate holes at the diſtance of a foot and a half, and only half as deep in the ground. Ten men will be able to plant, in this way, fifteen acres in one day. It may be proper to mention that this dibble or ſetting-tool muſt be made of ſteel and ſharp pointed, on which account the land choſen for the ſeed requires no previous preparation with the plough or ſpade.

OBSERVATION IV.

If the land has no coat of graſs upon it, it will be of advantage to ſow Birch and Aſh ſeed upon it, in the manner before mentioned;

mentioned; but if the ſoil is covered with graſs, or any thing elſe, on which theſe two delicate ſeeds, by being prevented from reaching the ground, might lie and rot, it will be neceſſary to remove a thin turf here and there entirely, in order to ſprinkle a few of theſe ſeeds on the bare earth.

Benefit of this Method of ſowing.

This method of ſowing the acorn is particularly well calculated and adapted for ſupplying the empty places of foreſts with freſh plants, where the wood has been irregular in its growth, either from the inroads of cattle or other accidents. It is hardly neceſſary to mention, that ſuch empty places upon being freſh planted ought to be carefully fenced in to ſecure them from any damage.

CHAP. III.

Of the Planting or Tranſplanting of young Oak Trees from the Nurſery into the Foreſt.

HAVING ſpoken of the acorn, or ſeed from whence the Oak is produced, and the manner of gathering, preſerving, and ſowing it, we come now to conſider it as a young tree.

The different Ages at which young Oak Trees may be tranſplanted.

Young Oak trees, where the ſoil is favourable, are fit to be tranſplanted at the age of ten or twelve years, or when their ſtem is about an inch and a half thick at the baſe, and about ten or twelve feet high; the proper ſeaſons for it being the months of October and November, and during the whole

whole winter, if mild, unto the middle of April. The mode of tranſplanting them is as follows:

Holes for tranſplanting.

The holes in which the young trees are to be ſet when tranſplanted, ought to be two feet deep, two feet wide, and at the diſtance of twelve feet from each other in every direction. Theſe holes ought to be made in the ſummer, and the earth which is taken out of them, laid in heaps beſide them to purify, until the autumn.

CAUTION.

The firſt and principal object of attention in taking the young trees out of the nurſery, is by a ſlight notch with a knife upon each to mark their ſituation there, that is, their expoſure to the North or

South, and the climate in general, which they have been accuſtomed to in it, in order that each particular plant or tree may have a ſimilar ſituation in the foreſt, to that which it had in the nurſery; as any alteration, with reſpect to air or temperature, might endanger the loſs of many plants that ſhould happen to undergo, by want of this precaution, ſuch a change: and no more trees muſt be taken up than can be planted in one or two days at fartheſt, without carefully covering them with earth or ſtraw, until they are wanted.

Of cutting the Roots.

After the young trees are taken up, which muſt be very carefully done, and without offering the leaſt violence to them; before they are tranſplanted, all the roots, excepting the ſmaller fibres or branches, muſt be cut clean and ſmoothly off, obliquely downwards, and on the inſide facing

cing the heart root, with a very ſharp knife, ſo as to leave them not above a foot in length, excepting the heart-root, which muſt be left as long as the depth of the hole into which the young tree is to be ſet.

And Tops.

If the top of a young tree is ſtraight, it muſt not be cut, but if a young plant that is ſound and ſtout, ſhould happen to have a top that is crooked and out of form, in ſuch a caſe, the top may be cut; ſuch a tree, however, will never grow to a great height, but run into branches; it is, therefore, better in general not to cut the tops of any of them: at the ſame time, all the leaves and branches, round and near the top, muſt be cut clean and ſmoothly off, and nothing left but the mere top.

Method of Tranſplanting.

After the plants are thus prepared, and the holes made for them, according to the dimenſions, and at the diſtance from each other before mentioned, they are to be planted by two men in the following manner. The one after fixing on the ſituation ſimilar to that which the notch on every plant ſhews him it had in the nurſery, is to place it in a hole; the other is to throw ſome looſe earth upon it; he who has the plant in his hand, muſt ſhake it, in order to make the earth come under, and round, and cloſe to the ſmall and tender roots; more looſe earth is then to be thrown into the hole, ſo as to cover the other roots, after which, one of the men muſt tread upon the earth in the hole with his feet, and preſs it cloſe round the roots, until the tree ſtands firmly by itſelf; the remainder of the looſe earth is then to be thrown into the

the hole, and trod upon as before. The young tree is at laſt to be covered with earth, one inch and a half higher round its ſtem, than it ſtood in the nurſery. When the holes are previouſly made, two men who are diligent and ſkilful, can in the ſpace of a day ſet an hundred and fifty trees.

Another Age for tranſplanting.

Oak plants alſo of ſix years growth only, whoſe ſtems are in general about the thickneſs of one finger, may be tranſplanted in the ſame manner, and with equal ſucceſs. Two men may ſet two hundred of them in one day, if the holes, which do not require to be ſo large, nor more than ten feet diſtant from each other, are previouſly prepared for them.

Method for thoſe of three Years Growth.

Laſtly, Oak plants of but three years growth will bear tranſplanting, but it muſt be done in another manner. The young plants of this age muſt be dug up with a ſpade, out of the nurſery, ſo as that the plants, and the earth about their roots, may be lifted both together, and removed in wheelbarrows, or other ſuch means of conveyance, to the ground, where they are to be tranſplanted. The holes for ſuch plants need be no larger than is neceſſary to admit the roots of the plants, and the earth about them: after which they require no further trouble than preſſing the earth about them cloſely down with the feet. Plants of this age may be tranſplanted during the whole ſummer, if the weather ſhould not happen to be dry.

OBSERVATION.

Plants of ten or twelve years old, though not ſo ſubject to damage from cattle, will receive benefit from being attended to for one or two years, until they are ſo firmly rooted, as not to be looſened, or otherwiſe hurt, by the cattle that may rub upon them. Plants of ſix years however, and eſpecially of three years growth, muſt be carefully fenced round, until they are grown ſo high, and are ſo firmly rooted as to be no longer liable to any danger.

Nothing is of more importance to a Foreſter than to ſelect and employ honeſt and ſkilful labourers in his ſervice. Such labourers ought to be bound by oath and penalties, faithfully to follow his inſtructions, and to do no hurt themſelves, nor ſuffer it to be done by others, to the foreſt. It ought to be an expreſs ſtipulation alſo between their employer and them, that

they are to be anſwerable for the growth of every tree they ſhall plant, for three years after it is planted; and that of plants of ten or twelve years old, no more than ten in a hundred ſhould be allowed for loſs; of plants of ſix years, no more than five to be allowed for loſs; and that of thoſe of three years, none at all ſhould be allowed for loſs. And that whenever the plants which fail of growth, exceed the number allowed for loſs to each of the three reſpective claſſes, in ſuch caſe the planters, upon receiving others from the nurſery, to fill up their places in the foreſt, ſhall plant ſuch without any conſideration or additional pay for their labour.

CHAP.

CHAP. IV.

Of the Beech Tree; its Species, Nature, Soil and Cultivation.

THERE are two ſpecies of the Beech tree: one is called the Red Beech, and the other the White Beech. We ſhall ſpeak firſt of the

Red Beech.

The Red Beech grows in general to as large a ſize almoſt as the Oak, but ſpreads where it has room, rather wider with its branches. Its growth, when raiſed from the ſeed, is quicker than the Oak. Its general uſes, and the age at which it is proper to be cut, are both too well known to need to be mentioned. The Beech, which thrives amongſt Oaks and other leafy wood,

wood, requires the ſame ſort of ſoil with the Oak, and is always more ſucceſsful in its growth from the ſeed than when tranſplanted. The wood of this ſpecies is not ſo hard as that of the White Beech, but both, if cut near to the root, in their fifteenth or twentieth year, according to the richneſs of their ſoil, and forwardneſs in growth, will ſhoot out new branches from their trunks. On this account, they are both very profitable trees amongſt other coppice wood; ſuch as the Oak, Plane, Lime, Aſh, Alder, Birch, Elm, Poplar, Walnut, Cheſnut, &c. and therefore highly deſerving of being cultivated, not only with greater care, but alſo in greater quantity than others.

Of ſowing the Red Beech.

The Red Beech does not bear ſeed ſo often as the Oak; for this reaſon a prudent Foreſter, who foreſees a ſeaſon in which the

the Red Beech will be fruitful in ſeed, will ſave no expences in preparing, in due time, as much land as he intends ſhould be ſown with that ſeed. The land where the Beech ſeed is to be ſown, requires leſs trouble and expenſive preparation, than that where Oak ſeed is to be ſown. If the land intended for the Beech ſeed is, or is not, in graſs, it is ſufficient to plough it to the depth of four or five inches; and after the ſeed is ſown, which ought to be done in the latter end of October, in the proportion of one buſhel and a half to every acre, with the mixture of a few other ſeeds, ſuch as Oak, Walnut, Filbert Nut, Elm, and Poplar; the land ſhould then be harrowed. If the ground cannot be ploughed, on account of its being ſteep, in holes, or full of ſtumps, let the ſeed be ſown on the bare land, as it is, and covered to the depth of four or five inches afterwards, by employing a ſufficient number of labourers with hoes. It will be of great uſe afterwards to ſow Birch and Aſh ſeed over the land, in the manner be-

fore

fore mentioned with the Oak. This land muſt alſo be well ſecured by fences from damage by cattle, until the young trees are out of their reach.

Planting of Beech Trees.

The planting of young Beech trees we do not approve of, for the reaſon we have before mentioned. The expence which it would occaſion, makes it more eligible to the Foreſter to wait for a favourable year of ſeed, and then to double his induſtry in ſowing.

Of the gathering of the Red Beech Seed.

The ſeed of the Red Beech ought to be gathered in the latter end of September, or the beginning of October. The huſk, or ſhell, which contains the ſeed, and reſembles that of a cheſnut, begins then to open; and

and the ſeed, whoſe form is like buck wheat, though larger, is conſequently ripe and ready to drop. At this ſeaſon, a labourer muſt be ſent up the tree, with a pole, to ſhake all its branches; by which means a ſhower of ſeed will fall at once to the ground, on which cloths ſhould be ſpread to receive it. The ſeed which is not immediately uſed, muſt be preſerved in the ſame manner as the Oak ſeed, until the ſpring, except that as it ſweats more, it muſt be oftener turned.

CHAP.

CHAP. V.

Of the White Beech.

THE White Beech grows in the ſame ſoil as the Red Beech, but will alſo thrive in a poorer ſoil. Its growth, however, is not ſo large as that of the Red Beech; its ſtem, which in height generally reaches from twenty to thirty feet, ſeldom attaining a greater thickneſs than that of a middling-ſized man. As the wood of the White Beech is extremely hard, it is particularly uſeful in the conſtruction of mills, where the hardeſt wood is requiſite. Its ſeed, which reſembles a cherry ſtone, and has ſomething like two fine wings attached to it, is ripe, and fit to be gathered, in the month of October; but as the magpies carry

carry off theſe ſeeds, and drop here and there, as many as are generally wanted, they ſave the Foreſter the trouble and expence of planting them: we ſhall therefore obſerve no further on this ſubject.

CHAP.

CHAP. VI.

Of the Plane Tree.

THE Plane is a tree of a fine growth, often exceeding thirty feet in height, and being about a foot and a half in thickneſs. It agrees with the ſoil of the Oak and Beech, and thrives the better to be ſown amongſt them. Its leaves reſemble thoſe of the grape. As its wood is very tough and hard, it is a very uſeful tree amongſt coppice wood. Coach and muſical inſtrument makers both give a high price for it. Its ſeed, which hangs in cluſters of two and three togerher, becomes ripe in October, and requires to be ſown before the approach of winter.

CHAP. VII.

Of the Mountain Aſh.

THE Mountain Aſh reſembles the Plane in its growth, the qualities of its wood, and in its ſeed, which is ripe at the ſame ſeaſon of the year. It requires alſo the ſame mode of culture.

CHAP. VIII.

Of the Common Aſh.

THE Aſh is a tree very well known; it grows rapidly in fat land, but does not agree with a wet ſoil. It is not only a uſeful tree amongſt coppice wood, but is the chief wood employed in the conſtruction of carriages, by coach-makers and wheel-wrights, and ſells to them for a high price. The leaves of the aſh being good food for horn cattle in winter, it is very profitable to ſow extenſive tracts of land with it. The ſeed of the aſh is white in colour, and very light, being furniſhed with a ſhell or covering, which being as light as chaff, makes it eaſily driven by the wind; on which account it requires to be ſown in the manner before deſcribed with the

the Oak. The ſeed which is ſown in autumn, lies for eighteen months in the ground; that which is ſown in the ſpring, comes up twelve months after. The Aſh is eaſily tranſplanted in its proper ſoil.

CHAP. IX.

Of the Alder Tree.

THERE are two ſpecies of Alder, the White and the Red, though they are much of the ſame nature and value. The Alder is a very uſeful tree as coppice wood, not only on account of its quick growth, and that it ſpreads the more it is cut; but as it will thrive in wet or ſwampy ſpots, where ſcarcely any other valuable wood can be raiſed. It is particularly adapted for buildings, or props under water; as if no air gets to it, it becomes as firm and hard as ſtone, and will ſtand for ever. The hatters give a great price for its bark, which they uſe in dying black. The ſeed of the alder, which is very ſmall, is ripe in the latter end of February, or beginning of March. The ground requires only a little hoeing before

before it is ſown; or if twigs about the thickneſs of a finger, are cut off the Alder, and ſtuck a foot in the ground, and left about a foot in length above it, they will take root like willows.

CHAP. X.

Of the Birch.

AS the Birch is a wood whoſe excellence for ſeveral uſes is well known, it will be unneceſſary to ſay much about it. It will grow in any ſoil, even if it is poor, provided it is dry. Its growth is quick and ſtraight, it is therefore uſeful as coppice wood, and particularly for making caſk-hoops. This tree is ſo full of ſap in the ſpring, that upon being bored, its juice can eaſily be drawn off in veſſels to a conſiderable quantity; the liquor thus obtained, is conſidered as medicinal in its qualities; but as the tree when wounded in this manner, never recovers, the Foreſter ought cautiouſly to prevent it. The Birch ſeed is ripe in September and October, unleſs it has been

been a cool and wet ſummer, when it does not ripen till November; at which ſeaſons, and alſo during any month of the winter, it may be ſown, even upon ſnow, though the beſt time is while the weather is perfectly calm and wet; as the lightneſs and ſmallneſs of the ſeed, as has before been mentioned, would, when there is the leaſt wind blowing, make it difficult, if not impoſſible, to be ſown regularly and effectually.

N. B. Unſkilful perſons may very eaſily be deceived, and alſo diſappointed with reſpect to this ſeed. In the months of June and July, the tree is clothed with an appearance of ſeed, but the ſubſtance which has this reſemblance, contains no ſeed, and ſoon falls off the tree. The real ſeed comes in little cluſters, in the months before mentioned; and when rubbed clear of its capſule, or ſhell, is of a brightiſh yellow colour, ſmaller than muſtard ſeed. The ſeed gatherer muſt, at the ſame time, watch

carefully for it, in the months of September and October, or in November, as a day or two after it is ripe, ſhould a wind come, he may loſe his ſeed entirely for that ſeaſon.

CHAP.

CHAP. XL

Of the Cheſnut.

THE Cheſnut is a well-known tree; a few of them may be planted amongſt other coppice wood, to ſupply thoſe which may be wanted for ornament to gardens, or elſewhere. As it does not properly belong to the foreſt, we ſhall obſerve no further concerning it.

CHAP.

CHAP. XII.

Of the Walnut.

THE Walnut, which is alſo a well-known tree, is more uſeful than the Cheſnut; its wood being good fuel, it may be introduced amongſt other coppice wood, and may be cut every fifteen years. As it is neceſſary alſo to gun and cabinet makers, the Foreſter will find it agreeable and convenient, to be able to ſupply *gratis*, what is wanted of it in his neighbourhood. He cannot, however, ſuffer it to grow to its full extent in the foreſt, becauſe its branches ſpread wide, and no other wood will grow under them; even the graſs beneath them is diſliked by the cattle.

CHAP. XIII.

Of the Elm.

THE Elm is a tree which grows rapidly, and to a great ſize. It thrives in a wet ſoil, and may be produced either from the ſeed or the plant. Its ſeed is ripe in the latter end of July, or the beginning of Auguſt, and if ſown immediately will raiſe a plant a foot high the ſame year, which is the caſe with no other tree in Europe.

CHAP. XIV.

Of the Poplar.

THE Poplar is greatly ſimilar to the Elm, but does not grow ſo quick, and prefers a dry ſoil.

Having now mentioned, what practice and experience has diſcovered of the nature and ſoil of the trees fit to be cultivated in a foreſt, and explained the manner of gathering their ſeed, ſowing and planting them; we ſhall ſtill, before we quit the ſubject of Leaf Trees, ſpeak of Coppice Woods.

CHAP. XV.

Of Coppice Woods.

A COPPICE is a piece of ground in a foreſt, where, after a ſhort period of years, the wood is to be cut; it being particularly formed for that purpoſe. The ſucceſs of Coppice Wood will depend greatly on the goodneſs of the ſoil. As the ſoil is more or leſs favourable, the wood will be fit to cut at twelve, ſixteen or twenty years. If we ſuppoſe the ground of a coppice to be three hundred acres in extent, and that the wood will be fit to be cut at the twelfth year, then every year after, twenty-five acres of the whole may be cut. If the wood will not be fit to be cut until the ſixteenth year, then every year after, only fifteen acres are to be cut. If the Coppice ſhould happen to conſiſt of wood which is all of an equal growth, or if the damage it

may

may have received from cattle has rendered it exceedingly irregular, and its growth but indifferent, it is moſt prudent in the Foreſter to cut the whole down at once, for the ſake of reducing it to order, provided he does not overſtock the market. After which it may be laid out in ſeparate diviſions, and cut periodically, in the manner juſt mentioned. At the ſame time it is particularly requiſite, that a ſufficient quantity of trees and under-wood be left ſtanding for ſhelter on the borders of the foreſt, expoſed to the North or other cold winds. It is further to be obſerved alſo, that the wood in a coppice muſt invariably be cut by beginning in the ſouth, and proceeding in a northern or a north-weſt direction; the proper months for which are thoſe from the beginning of November until the middle of March.

Of

Of Wood Cutters.

The employment of wood cutting muſt be given to faithful and honeſt labourers, who are duly qualified for their office, and in particular, well provided with ſuch ſharp tools as are requiſite for their work, in order that they may always cut the ſtems of the trees clean and ſmoothly off, in an oblique or ſlanting direction, within a hand's breadth of the ground, ſo as that no water may be able to lodge on the top of the ſtock, which otherwiſe might ſoon rot it entirely.

It muſt carefully be obſerved in cutting coppice wood, that at the diſtance of about every twenty or twenty-four feet, a young tree of fine growth, particularly if it appears to ſpring from the ſeed, be left ſtanding; if it ſhould have any young branches growing on it, not higher than a man can reach with an ax, they muſt be cut cleanly off,

off, cloſe to the ſtem; the trees which are the moſt advantageous to be left ſtanding in this manner, are the Oak, Beech, now and then a Birch, and a few Aſh trees; but the Oak will deſerve the principal attention, particularly, if it appears to have ſprung from the ſeed, which it will be neceſſary to be at great pains to diſcover.

At what Time the Wood which is cut ought to be taken away.

After the coppice has been cut, the wood muſt all be carried off the ground, where it is cut, before the month of May; otherwiſe it will occaſion much damage to the young ſprouts, who then renew their growth; the ground muſt then be well ſecured as has before been mentioned from the inroads of any kind of cattle or deer.

CHAP. XVI.

Of ruinous Foreſts.

HAVING thus far explained the culture of the principal leaf woods, we ſhall conſider the ſtate of ruined foreſts, and the beſt method of recovering them from waſte, and reducing them to order and regular growth. A ruined foreſt is a tract of land from one to ten thouſand acres in extent, which has become waſte and decayed from neglect, the want of encloſures, the inroads of cattle, and ſuffering other damage and miſchief; where there are but few or no good trees left ſtanding; and the tops and branches of thoſe which remain are cut off; where there is nothing, in ſhort, to be ſeen, but a few bare ſtems, of no length, and the reſt of the ground covered here and there, with buſhes, of no

value. In order to reſtore this ground to proper order, and bring it into the form of a regular foreſt, the following method muſt be obſerved:

The firſt thing to be done, is to make a ſurvey of the foreſt, and aſcertain its exact extent: and alſo what claims there may be upon it, by any of the neighbouring inhabitants. When this enquiry has been made, and there ſhould be demands found upon it, particularly for paſture, application muſt be made in good humour to the reſpective claimants, to agree that ſuch encloſures may be made, as the recovery of the foreſt from its ruinous ſtate may require.

When this point is ſettled with the inhabitants in the neighbourhood, and the full extent of the foreſt is known to be five, ſix ſeven, eight, or ten thouſand acres, which bring in nothing, and ſerve only for a few cattle probably to range in; the ſoil ſhould then be examined, in order to fix where encloſures may moſt advantageouſly

tageouſly be made. If the extent, for example, is ten thouſand acres, a portion of one thouſand acres may eaſily be ſpared for encloſure from the whole. If it would prove inconvenient to the neigbouring inhabitants, to throw this number of acres into one encloſure, in one quarter of the foreſt, ſeparate encloſures of one hundred acres each may be made in different places round the foreſt, and if theſe encloſures border on the ground of the neighbouring inhabitants, ſome expence in the fencing them will be ſaved. Theſe encloſures, if they are treated, as we ſhall preſently direct, will require to be continued for ten years, after which they may be thrown open to the inhabitants, and others made in their room, until the whole foreſt, by degrees is recovered, and re-eſtabliſhed in its form and growth.

When the places for the encloſures are fixed upon, and the ground is fenced in, all the uſeleſs trees taken out, the buſhes

cleared off close to the ground, if any young trees ſhould then be found amongſt them, that may have eſcaped all injury from the cattle, or any other accident, ſuch muſt carefully be left ſtanding, particularly any young Oaks that ſeem to ſpring from the ſeed. If the wood which is thus cleared off, is worth diſpoſing of, let it be ſold to pay the expence of the encloſures, but if it is too inſignificant in value for ſale, after making part pay the expence of cutting and clearing it away, let the remainder be preſented to the inhabitants of the neighbourhood, who may be entitled to under-wood, on condition of their carrying it away.

After ſuch ſteps as are mentioned have been taken, the acorn and other ſeeds may be ſown, and covered with earth by means of hoes, as we have already directed in Chap. IV. concerning the Beech. In caſe there ſhould be any ſcarcity of Beech ſeed, on ſuch occaſions, a greater proportion of the Oak ſeed muſt be ſown.

It will be found exceedingly uſeful to allot four or five acres of ſuch an enclo-ſure for the formation of a nurſery, in the manner directed in Chap. II.

CHAP. XVII.

Of the Preſervation and Management of regular or full-grown Foreſts.

THE chief object to be attended to in a regular and full-grown foreſt, is to diſcover every tree that has attained its full growth, and mark it, that it may be cut, but always according to the following rule; viz. no wood that is above a half a foot in thickneſs, ought to be cut with an ax; but muſt be ſawed; as the ax makes a great waſte, particularly of large trees; and if not ſold, laid carefully by till it is wanted; the old ſtock muſt be rooted out as ſoon as poſſible afterwards, and its vacant place in the foreſt filled up with ſtout plants from the nurſery belonging to it.

If a full-grown tree, which happens by accident to ſtand amidſt a number of regular young trees, ſhould be particularly required

required to be cut, trial muſt be made if its branches cannot firſt be lopped off, and let fall gently by means of ropes, for fear of their hurting the young trees around; but if after this is done, there is ſtill danger of great damage being done, it is better to let ſuch a tree ſtand, after its branches are cut off, and go to waſte, until the wood around it comes in due time to be cut down alſo, and rooted out.

No tree in a complete foreſt ought ever to have its branches lopped, or its top cut, and particularly not the Oak. The moment its branches are lopped off, or its top cut, the ſun immediately burns the ſpot where the ax has been, and renders it ſo tender, that the wood pecker eaſily makes holes in it, the cold and rain afterwards penetrate into the wood, and mixing with its ſap, in a few years the tree rots, and its timber proves uſeleſs. The caſe is very different where an Oak, or other tree, in full growth, happens to ſtand ſo near

the land of the huſbandman, as to damage it by the ſhade and over-hanging of its branches. There, rather than endanger the loſs of the good will of a neighbour, the branches which do any injury to his ground, ſhould be permitted to be cut off; but it is to be obſerved, that any tree ſo deprived of its limbs, and particularly Oak, will never thrive ſo vigorouſly afterwards, nor yield ſuch good timber.

When the Manager and Director of a foreſt meets with a good year of ſeed, he may order more timber to be cut than he is immediately in want of, provided it is fit for cutting, but not before the ſeed is ripe and dropt from the trees; as while the timber which is cut is carrying out of the foreſt, the ſeed is trod into the earth, and the next ſpring, plenty of it will come up.

It is extremely requiſite alſo to prevent more roads than are abſolutely neceſſary from being made through a foreſt, particularly where there is young growth,

and

and that every thing, ſuch as fuel, timber, &c., be carried off before the month of May, that the foreſt may have reſt and freedom for growth.

CHAP.

CHAP. XVIII.

Of the Sap of Trees.

AS the ſap of trees is a ſubject which has given riſe to a variety of opinions concerning its nature and properties, we ſhall only make ſuch remarks upon it, as are neceſſary in the preſent work.

The general rule obſerved in the œconomy of foreſts, is, that no wood is to be cut while the ſap is in it; but this point is not well underſtood; as there is always ſap in a healthy tree in winter as well as in ſummer; but as the earth becomes bound up in winter, ſo as that the roots can extract little or no nouriſhment from it; and as the cold contracts the whole tree, leſſens its power of admitting that nouriſhment, and makes it ceaſe growing during that ſeaſon; the idea of ſap not being in it ſeems merely relative, and would be more pro-

properly expreſſed by ſaying, that its ſap did not circulate, or was not in motion through the tree, during winter.

If an Oak, Beech, Alder, Aſh, Birch, or even a Fir tree, is cut down in the month of December, January, or February, its top and branches lopped off, and the ſtem allowed to lie without hurt to its bark, until June following, the bark of it will then peel as eaſily off, as the bark of a tree which is cut at any time between the beginning of April and the end of Auguſt, when only the ſap is ſaid to be in it; but if it is let lie for a year after, the bark will then not peel off at all, becauſe the tree is then dead, or in other words, its ſap is evaporated and gone.

CHAP.

CHAP. XIX.

Of the Bark of Trees.

THE bark of many of the foreſt trees, is a ſubſtance of great uſe for various purpoſes of life, both in the arts and manufactures; and were there no other object aimed at in the growth of a foreſt, theſe alone would deſerve the moſt ſerious attention.

The bark of trees is an indiſpenſably neceſſary article to Tanners, who give a good price for it. A judicious Foreſt Maſter, therefore, whoſe endeavour is to make the wood of the foreſt turn out to the beſt advantage, will take care that the bark is peeled off at the proper ſeaſon. For example, if he foreſees in the winter, that a piece of coppice-wood will be ready for being cut in the fall of the year, he will conſider what other advantage he can make of

of it, before it is cut down. For this purpoſe he will order the bark to be peeled off ſuch trees in the months of April or May, when it can be eaſily done; taking care, at the ſame time, never to peel the bark lower down than within one foot and a half of the baſe of the ſtem. Some of the beſt trees, however, are to be left ſtanding for ſeed, to about the number of twenty on every acre, and muſt, therefore, be carefully marked, that none of them may be peeled by miſtake. By the fall of the year, when the peeled trees are to be cut down, the ſeed of the others, if they have born any during the ſummer, will have dropt upon the ſoil beneath, and while the wood cut down is carrying off, will be trod into the ground.

CHAP.

CHAP. XX.

Of Needle Wood or Firs.

THERE are three ſpecies of Needle Wood or Firs: the Norway Fir, the Scotch Fir, and the Silver Fir. The firſt grows the higheſt and the largeſt, and its timber is rather preferable to that of the other two. Neither of the three will thrive when tranſplanted; it is, therefore, unneceſſary to form any nurſery for them, unleſs it is for Gardeners, who may want them for ornament or otherwiſe.

The ſeed of the Firs, which is conical in form, is ripe in November and December, and muſt be gathered off the tree from between the latter end of the former until the beginning of March. If the ſeed is not gathered before the latter month, the ſun will open the ſeed veſſels, and the firſt wind will carry them off to a great diſtance,

as

as they are very light, being furniſhed with a thin chaffy ſubſtance, like wings, attached to them; by which means the cone is left empty. After the cones which are properly ripe have been gathered, from the higheſt and healthieſt trees, on which the ſun has freely ſhone, they muſt be laid on a dry wooden floor, where they can have free air, and be often turned. If they are not regularly turned, they will ſoon grow moiſt, rot, and the ſeed will become uſeleſs.

After the cones are in this manner well dried, in the beginning of March, and from thence until the middle of April, when the ſun begins to gain power, large linen cloths muſt be ſpread on a dry piece of ground, and the cones laid upon them in the ſun, and often turned with a rake, until they open and let out the ſeed. The greateſt care muſt be taken that the cones are never wet by rain or any thing elſe, otherwiſe they will never open.

Some people, but in particular, Seed Dealers, lay the cones in an oven, where they

they ſoon open, and let their ſeeds out; but this is a very unſucceſsful method; for the beſt part of the ſeed is dried up by it, and when ſuch ſeed is ſown, although it comes up, the plant proves unhealthy, and dies in the following winter.

This unnatural manner of maturing the Fir ſeed, is a very fraudulent practice of the Seed Dealers: thoſe who mean to deal a little more honeſtly, mix ſome good and bad ſeed together; which is the reaſon that ſo many diſappointments happen to thoſe who ſow Fir ſeeds. From hence it is evident, that whoever would be ſucceſsful with this tree, or ſupport his own credit by making others ſo, muſt carefully watch and attend to the ripening of its ſeed, in the manner above mentioned.

The ſeed of the two firſt ſpecies of Firs, namely, the Norway Fir, and the Scotch Fir, will not preſerve longer than two ſeaſons; and in order to keep them ſafe and ſound during that time, they muſt be hung up in bags, in a dry place, where

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in particular no mice can reach them, as they are paſſionately fond of theſe ſeeds. The ſeed of the third ſpecies, or Silver Fir, which is both large and oily, will only keep during one ſeaſon, with ſafety; if it is not ſown immediately after it is gathered and ripened, it muſt be mixt with very dry ſand, and laid up in a heap, until the following fall, when it ought to be ſown as ſoon as poſſible, in the month of November. As it is a ſeed which ſweats a great deal, and apt to ſtick in lumps together, if it is not preſerved in this manner, it dries, and becomes hollow and uſeleſs.

CHAP. XXXI.

Of the Soil, Seaſon, and Manner of ſowing Firs.

THE Norway Fir will grow in a poor ſandy ſoil. As its roots run flat in the ground, it is always requiſite to examine whether there is any hard black ſoil immediately under the ſand; for if it ſhould happen, that this hard black earth is within leſs than between two or three feet depth of the ſurface, the roots of the tree will reach it too ſoon, and be ſtopt in their growth; when this black ſoil is about the depth before mentioned under the ſand, it will be ſufficiently moiſtened and looſe, in the courſe of ten or fifteen years, from the growth of the roots, and the ſhade of the tree above it, to allow the roots to penetrate into it, and draw nouriſhment to the trunk and branches. The ſame caution is neceſſary with the other ſpecies, the Scotch Fir,

and

and the Silver Fir. The latter, however, agrees beſt with a ſoil that is a little richer than mere ſand.

The Norway Fir and Scotch Fir ſeeds, which are much of one ſize and nature, may be mixed together, and ſown from between the end of March until the beginning of May; and afterwards alſo preſerved ſeed may be ſown, from November until the beginning of May, even during ſnow in winter, in the proportion of three pounds of ſeed to an acre. Theſe ſeeds will be more regularly ſown, if ſome dry ſand is mixed with them, by which means the ſower will be able to take them up in handfuls, inſtead of a ſmaller quantity, at a time, and ſow them as regularly as any kind of grain.

The ſeed of the Silver Fir, as has already been mentioned, is large, and requires a better ſoil. Six pounds, therefore, are neceſſary to an acre, when ſown without the mixture of any other ſeed with it; when the ſoil is not very poor, the ſeed of

the other two may be mixed and ſown with it, in the proportion of two pounds of the Silver Fir to one pound of each of the other two, on every acre. The proper time for ſowing this ſeed, is the month of November, and during the winter; but the ſooner it is ſown the better, as it does not keep with ſafety, as before mentioned. Many may be of opinion, that the quantity of ſeed we allow to an acre is too great; but experience has proved the contrary: we have tried different quantities, and found that where the proportion was about three pounds of ſeed to each acre, the growth has always been the moſt ſucceſsful; when only one or two pounds have been allowed to the acre, the ground has required to be ſown over again in two years after; theſe particulars have alſo been confirmed to us by the practice and experience of ſome of the oldeſt Foreſt Maſters in Germany: in ſhort, it ſeems, that the thicker Firs grow together, they thrive the better, as ſhall be more fully explained hereafter.

Pre-

Preparation of Land for Firs.

The preparation of land in which Fir ſeeds are to be ſown, is attended with little trouble or expence. If the ſoil is a clear ſand, with little or no turf upon it, the Norway and Scotch Fir ſeeds may be at once ſown upon it, without any preparation; but afterwards it muſt be harrowed with a ſlight harrow. No cattle, however, and in particular, no horn cattle, muſt be ſuffered to go upon it, unleſs it is a large tract of land, of an hundred or more acres in extent; in which caſe, the damage they may do will be trifling, as they are not ſo fond of theſe as of leaf woods.

If the land ſhould be covered with heath, or fern, it muſt be cut or burnt off; the ground ſhould afterwards be hoed or ploughed, if it is not too rugged, and, laſtly, harrowed; then it muſt be ſown, and again ſlightly harrowed: but if the weather at

the time of ſowing is rainy, or if there is ſnow on the ground, the harrow is unneceſſary.

N. B. It will be of ſervice to ſow ſome furze ſeed amongſt the Norway and Scotch Fir ſeed, and particularly along the borders of the foreſt, as it will ſerve for a fence againſt the inroads of cattle.

Of cutting Firs.

On no pretence whatever ought any young Firs to be cut, until they are at leaſt twelve or fifteen years old; then, however, they may be cut, as they will be uſeful for making hop-poles, ladders, oars, &c. The profit ariſing from this firſt and neceſſary cutting, will repay the whole expence of ſowing; after which, the ground may be laid entirely open to cattle of every kind, as they will be rather of benefit to it, than otherwiſe, particularly by their rubbing off the dry branches from the trees. Six

years

years after, another cutting may be made, when the wood will be fit for ſmall maſts for boats, and other purpoſes, taking care to leave the beſt trees ſtanding, at the diſtance of no more than five feet from each other, ſo as that their tops and branches may ſtand cloſe, and mix, in order to protect and ſhelter each other. At the end of twelve years after this ſecond cutting, a third cutting may be made, which will yield boards of a foot in diameter; then the beſt trees muſt be left ſtanding, at the diſtance of ten feet from each other; ſo as that their branches, from their increaſe of growth, may ſtill meet together; after which they ſhould be allowed to ſtand undiſturbed for fifty, ſixty, or ſeventy years, until they have attained their full growth, and are fit for the largeſt maſts, and all the other uſes of the wood.

That a return ſo very profitable may be gradually obtained from a tract of land, which, from its poverty of ſoil, is conſidered as waſte, and conſequently uncul-

tivated and unoccupied, is an object to which every poſſeſſor of ſuch land may, with great juſtice and propriety, give his moſt ſerious attention.

Of the Growth of Firs.

The growth of the Fir is extremely ſlow for the firſt three years; this is owing to the poorneſs of the ſoil in which it is produced, and conſequently the ſcanty nouriſhment it receives. As after this period it begins to ſhed its leaves on the ground where it ſtands, the ſoil becomes every year improved by being kept warmer and moiſter, and the growth of the tree encreaſes in the ſame proportion; ſo that in its eighth year it is full ten, if not twelve, feet high; and Firs will grow ſo cloſe together, that at this age a boy can hardly paſs between them.

CHAP.

CHAP. XXII.

Of the Preſervation and Management of regular full-grown Fir Foreſts.

WHEN a Fir foreſt has nearly arrived at maturity, it is time to conſider how it may be made moſt profitable to its owner, and alſo of preparing it for a new growth. The cutting muſt begin in the ſouth-eaſt, and proceed in a north-weſt direction. If the wood ſhould be cut in the oppoſite direction, the north-weſt winds, to which the foreſt would by this means be expoſed, might endanger the loſs of a conſiderable number of trees, by that ſtormy wind, particularly as the roots of the Firs run flat, and therefore have not a very ſtrong hold of the ground; an inſtance of which happened to the Hartz Foreſt, that belongs partly to the Hanoverian, and partly to the Brunſwick

wick dominions, in Germany; by the want of this precaution, the trees of that foreſt, at the time of cutting them, were blown down by a violent north-weſt wind, for ſome miles, in one continued line of direction, upon each other.

Time of cutting Firs.

The time for cutting Firs of full growth is from the middle of April to the middle of May; as by that time the ſeed has dropt from the trees; while the cut wood is carrying out of the foreſt, the ſeed is trod into the ground, and therefore ſaves the trouble and expence of ſowing it. At the ſame time, for fear of accidents, it is prudent to leave on every acre one tree ſtanding, for the ſake of ſeed the next year, provided it is full of branches, and not too high. All the timber which is cut, muſt be taken immediately after out of the foreſt, that the young

young growth from the ſeed may remain undiſturbed.

Of a complete Fir Foreſt.

A Fir Foreſt is complete, when ſixty full-grown trees are ſtanding on every acre; the greateſt part of which are from fifty to ſeventy feet long, and four or five feet in diameter at the baſe: but if the trees are younger, and only from thirty to forty feet long, and from two to three feet in diameter at the baſe; then there ought to be in a complete foreſt, one hundred and twenty on every acre. The produce of a complete Fir foreſt, from the time of the firſt cutting, when there are at leaſt fifteen hundred on every acre, of fifteen years growth, may thus be eaſily calculated.

CHAP.

OBSERVATION.

The cultivation of Firs is a more beneficial branch of agriculture than is generally imagined. In the firſt place, Firs will grow on a ſoil, which is unfit for grain, and where no paſture or graſs will ſpring. It pays for the expence of ſowing it, at an early growth. Its timber is uſeful for a variety of purpoſes; its reſin produces tar, pitch, and turpentine; and, laſtly, the ſoil where it thrives, is ſo much improved by its growth, as to become fit for all kinds of grain and paſture afterwards. In ſhort, all waſte and barren land thus employed, may be ſaid to be ſo much new ſoil of great value gained to its proprietor.

In the year 1766, his late Pruſſian Majeſty began to examine the ſtate of his foreſts, and gave orders for the careful cultivation of them to the utmoſt advantage poſſible to his revenue and kingdom;

dom; and that all the reports made from time to time by his Foreſt Maſters, concerning the foreſts, ſhould be ſent regularly to himſelf, that he might inſpect the progreſs which they made in the improvement of them. Having had the honour to be one of his Foreſt Maſters, I received many letters from his Majeſty, which are ſtill in my poſſeſſion, on the ſubject of my charge. It was the particular will of that Monarch, that the Larch tree ſhould be introduced and carefully cultivated in his dominions. For this purpoſe he not only tranſmitted me ſome ſeed, but alſo ordered me to go into Swabia, where the Larch was to be found growing in the higheſt perfection. I found the nurſeries for them there ſo well prepared, as to be fit for the fineſt flowers; and in the firſt year the plants in them were two, and in the ſecond year near four feet high. The ſeed which his Majeſty ſent me, I ſowed with Fir ſeed, and found that in the firſt year, the plants grew four inches. The trees which I had ſeen in

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Franconia, in Swabia, were ſown amongſt Oak, Beech, and Fir; but on examination, I diſcovered the ſoil was richer than ſand. The foreſters there, however, informed me, that the Larch will, in the ſpace of twenty years, grow from thirty-five to forty feet high, and about the thickneſs of one foot at the baſe of the ſtem. The Larch ſeems, upon the whole, to be a wood worthy of cultivation amongſt leaf wood in the foreſt, where the ſoil is better than a Fir ſoil; although its ſeed, which is ſmall, and ripe at the ſame time with the Fir, is expenſive, when ſown in any quantity. Though its growth is beſt from the ſeed, it will bear to be planted better than the Fir. Amongſt Firs it grows nearly to the ſame height with them; but amongſt leaf wood, to fifty or ſixty feet high. Its leaves are like thoſe of the Fir, but they hang downwards on each ſide of the branches, and are ſhed, like thoſe of the Oak, every year. The Larch grows quicker than the Fir. Its bark ſplits like the bark of the Oak. Its wood,

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on account of its being very hard and durable is much prized by Cabinet Makers; when employed in water buildings, the wood turns black, and is very lasting.

Ebony also, whose seed is in form like Buck Wheat, and found at the top of the tree, will grow on flat or high land, though not very high nor thick; yet as it admits of a very beautiful black gloss or polish, when wrought, and neat work, and is therefore prized by Cabinet Makers, it ought not to be entirely omitted in a general forest.

CHAP.

CHAP. XXIII.

Of the Manner of preparing Heath Land for Firs.

HAVING ſhewn the method of treating Firs, or Needle Wood, in the foreſt, we ſhall now ſpeak of the preparation of heath land for the Fir ſeed. If a tract of land choſen for ſowing the Fir ſeed, of leſs or more extent, happens to be covered with heath, as the ſeed cannot well be ſown until the heath is removed, the beſt method of doing ſo, is to burn it off in the following manner: In the fall of the year, when the heath is perfectly dry, let the part intended to be burnt off, be firſt marked out by a line of about twelve feet in breadth drawn round it, the heath on which muſt be mowed off with ſcythes, and the turf hoed off, and both thrown inwards. This line is to prevent the fire from ſpreading

ing beyond the limits of the portion that is to be burnt off. When this is done, fire muſt be ſet to the heath in dry weather, ſo as to drive with the wind, that it may at once be completely burnt ffo. In caſe of accidents, however, a ſufficient number of labourers ſhould be ready, with buſhes or other means of extinguiſhing fire, in order to cruſh it wherever it may be ſpreading beyond the ground within the line. The ſeed may immediately afterwards be ſown, without any further preparation of the land; and then covered by the harrow. If the ground cannot be harrowed, it will be ſufficient if the ſeed is ſown in hard rains, or upon ſnow, either of which will fix it in the earth.

It is exceedingly requiſite to keep watch the firſt night after the heath has been burnt, leaſt any fire that may have eſcaped obſervation, ſhould again rekindle it, and occaſion ſome damage.

Beſides the Leaf Woods and Needle Woods which have been mentioned, there

are others, ſuch as the Willow, Thorn, and many Shrubs, which, though valuable for various purpoſes, do not deſerve to be introduced into the foreſt, but ſuch when they come there, as they generally do naturally, may be employed for making live hedges, which will ſave more valuable wood from being uſed for dead fences.

CHAP. XXVI.

The Method of extinguiſhing Fires in Foreſts.

A FIRE in a foreſt is of all accidents one of the moſt alarming and dangerous that can happen to it. It ſpreads ſo rapidly, and commits ſuch ravages, eſpecially among Fir Wood, that nothing ought to be more carefully guarded againſt.

Negligence of Workmen.

A variety of circumſtances may occaſion fire in a foreſt. It may proceed in the firſt place from the negligence of the wood-cutters, or other ſervants belonging to the foreſt, who after having made a fire for neceſſary purpoſes to themſelves, or the

buſineſs of the foreſt, leave it improperly extinguiſhed; whence by touching on dry leaves or graſs, it ſpreads in their abſence, until it communicates to the foreſt at large. On this account it will be eaſily ſeen that a Foreſt-maſter cannot be too careful and particular in the choice of his ſervants and labourers, and that he is under the neceſſity, if he would diſcharge his own duty fully, of engaging only workmen of the beſt character, who can be reſponſible in themſelves, or by others, for their ſkill, induſtry, and fidelity.

Vagrants or Gypſies.

Vagrants or gypſies alſo, by their negligence, may be the means of deſtroying a foreſt by fire. While ſtrolling about, they often take ſhelter and make a halt for ſome days in a foreſt. As they have no conſequences to apprehend to themſelves from any accident of fire, they are leſs

fearful, and more negligent of danger; and thus it happens that while they chance to be either intoxicated or aſleep, a fire improperly placed, and left to itſelf, may communicate to the timber near it, and ſpread till it becomes general. In order to ſecure a foreſt from all accidents of this nature, it is neceſſary that the Foreſt-maſter, or his ſervants, ſhould conſtantly be watchful of every perſon who enters the foreſt, and makes any ſtay in it, that no part of his charge may ſuffer or be endangered by ſtrangers or paſſengers.

SMUGGLERS.

Smugglers alſo often make a ſtop, and ſecrete themſelves in foreſts, and may by the ſame means therefore prove the cauſe of the foreſt being ſet on fire.

SHOOTING.

The wadding out of a gun when fired may fall amongſt dry leaves or graſs, and raiſe a fire. This is another particular in which the attention of the foreſt ſervants is alſo requiſite, beſides that a general caution ſhould be given to all who happen to paſs through the foreſt with a gun.

Method of extinguiſhing Fires in Foreſts.

If by any of the above-mentioned accidents a fire is kindled in a foreſt, either amongſt full grown timber or coppice wood: the firſt precaution to be taken is to cut down the wood before and around the fire, ſo as to let it fall inwards upon it, which will not only check the progreſs of the fire, but help to extinguiſh it. The tools neceſſary to aſſiſt in this purpoſe,

purpoſe, are axes, ſpades, ſhovels and rakes. Buſhes alſo will help to ſtop it. A circular line muſt be made round the fire to confine it to as narrow a compaſs as poſſible. The ground of this line muſt be cleared of wood, buſhes, graſs, leaves, or any thing elſe that is capable of feeding or ſpreading fire, and the whole thrown inwards by means of the inſtruments above-mentioned, to prevent it from communicating further. A ſmall circular ridge of earth alſo ought to be immediately thrown up around it to hinder its progreſs along the ground, even after it is apparently extinguiſhed; the ſpot where it has burned, ought to be watched for twenty-four hours after, leſt it ſhould ſecretly break out again.

OBSERVATION.

It would be exceedingly proper that the inhabitants in the neighbourhood of every

foreſt, who when an alarm of fire is raiſed, might naturally be willing to give their aſſiſtance in extinguiſhing it, ſhould be acquainted with the tools or inſtruments that are neceſſary to be brought with them, in order to make themſelves uſeful and aiding on ſuch occaſions. It is common on ſuch alarms to find few provided with any other tool than an ax; but ſpades, ſhovels, rakes and buſhes, are all equally neceſſary to the purpoſe of extinguiſhing fire, it being often impoſſible to have the aſſiſtance of water eſpecially in dry weather.

CHAP.

CHAP. XXV.

Of the Cauſes of the increaſed Value of Timber within theſe hundred, and even fifty, Years laſt paſt.

THE value of timber has increaſed in moſt of the countries of the chief maritime powers of Europe, within theſe one hundred, and even fifty, years laſt paſt. This particular is eaſily accounted for. As thoſe countries have become populous, the increaſe of their inhabitants and their arts has naturally occaſioned a gradual augmentation of buildings for their habitations, their manufactures, and commerce. Houſes have not only been exceſſively multiplied in number, but ſtill more extraordinarily enlarged in their ſize and dimenſions; the humble roofs which ſafely houſed our forefathers, are found to have been conſtructed on too rude a model for poſterity

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to imitate. The dwelling of a modern peaſant even is almoſt a palace, when compared with the hut of one of his anceſtors. The furniture of the meaneſt habitations, is now an article of conſiderable value, and of equal neceſſity to the poſſeſſor; and that of the rich is ſo various and coſtly, as to have no bounds to its ſuperfluity and elegance. Manufactures of many different kinds, which now exiſt, and are daily invented, require alſo innumerable ſtructures of wood, both below and above ground, for carrying them on, not to mention the great and conſtant uſe which ſome of them make of charcoal. Laſtly the commerce of mankind by the means of navigation has become ſo general and extenſive, that the different nations of it, particularly of Europe, have engaged almoſt their whole capitals in it; this at the ſame time has made them ſo vulnerable by ſea, that the field of war is as often choſen upon the water, as the land, and the ſtouteſt and largeſt timber, therefore,

is

is continually in high demand for the conſtruction of ſhips capable of attacking or defending one enemy from another. As longer voyages are alſo now made in trade, it has become neceſſary to import larger cargoes, which therefore has occaſioned the veſſels fit for ſuch commerce to be ſo encreaſed in their ſize and burden, as to exceed the former uſual freight of merchantmen, often ſeveral hundred tuns.

Theſe cauſes of the multiplied demand for various ſorts of timber, which attend every nation in its progreſs in refinement, and in the arts of war and commerce, has by no means been followed by a proportionate increaſe in the culture of them. On the contrary, as a country becomes fully peopled, and land grows in requeſt, the foreſts, inſtead of being enlarged for the purpoſe of extending their general uſes, are the grounds that have been firſt encroached upon. Cattle, too, naturally multiply in proportion to inhabitants; the foreſts are alſo their refuge, whenever there is the leaſt

ſcarcity

ſcarcity of proviſion for them elſewhere. But the damage done by the latter when they have not room to range in, and are driven by diſtreſs into the foreſt, is often irreparable for a number of years. The culture of foreſts, in ſhort, the ſowing, planting, and management of them according to rule and neceſſity, has been neglected and deferred, from motives both of indolence and overſight, each nation having been ſatisfied to ſupply their preſent wants, without œconomy or regard to poſterity.

Theſe are the reaſons of the late high price and increaſing value of timber, which muſt continue until the agriculture of foreſts is properly regulated and encouraged.

This ſcarcity and conſequent dearneſs of timber is attended with another circumſtance of inconvenience, if not alarm to ſeveral nations of Europe. They are obliged on this account to go to a foreign market, and thereby rendered dependent on the will of another power for their ſupply.

ply. Beſides the drain of money occaſioned by the purchaſe of ſuch a neceſſary abroad, the precarious ſtate and nature of ſuch a reſource in caſes of urgent want is evident; the trade, by various ſtratagems, may be ſhut up, and the nation denied it, diſabled and reduced.

CHAP.

CHAP. XXVI.

Of the Cauſes and Prevention of the Decay of Growing Timber.

AMONGST other attentions of a Foreſt maſter and his ſervants, none is more important and neceſſary than that of obſerving the cauſes, and uſing means for the prevention of the decay of growing timber.

FIRS.

Fir trees are often apt to fail in their growth. If the ſtratum of black, and exceſſive hard earth, which is generally found under the ſurface of a ſandy ſoil, as has before been mentioned in treating of the fir, ſhould be at ſo ſmall a depth that the roots of the fir reach it at too early

early a period; that is before the ſhade of the tree, and the nurture of its leaves upon the ground beneath it, have moiſtened this black earth, and made it penetrable by the roots of the fir, the growth of the tree is checked. The top branches become dry and wither. If the covering which the ground receives from the leaves that drop upon it, ſhould be carried away by ſtealth or otherwiſe, for manure, as is ſometimes done, when its excellence for ſuch a purpoſe is found out, the roots of the fir, which run flat in the ground, are immediately chilled, and the tree loſes its health. If in the thinning a fir foreſt, regard is not paid to the keeping them ſtanding firm and compactly together, ſo as to give ſhelter to each other, the leaſt admiſſion to cold winds, ſo as to ſhake their roots, or too much ſun, ſo as to dry them, will injure and impair their growth.

The previous examination therefore of the ſoil where Firs are to be ſown, and carefully

carefully watching their growth afterwards, that no ſuch accidents as are injurious to it, may happen to them, are the moſt certain means of raiſing them ſucceſsfully, and preventing, as much as poſſible, their decay.

OAKS.

The Oak, as we have ſaid before, is a ſtout tree, and well protected againſt the violence of winds, by the firm and deep hold which its roots have of the earth. But ſtill it is, in ſome other reſpects, tender, and liable to many injuries. Oaks in full growth are often ſo chilled by the late froſts and blights in the Spring, as all at once to ſtop their growth. The moment this is perceived by the Foreſter, from the different indications which they will give him of their being in this ſtate, as he cannot recover ſuch trees, or prevent their decay, his only remedy is to mark them for

for cutting, as ſoon as convenient. If an Oak ſhould happen to loſe a limb by the force of the wind or any other accident, the ſame courſe muſt be taken with it.—The cloſer therefore, Oaks are kept together, and the more they are defended by their ſituation from wind and cold, ſuch accidents will leſs frequently befal them.

If the ſoil where Oaks are growing ſhould accidentally prove wet, from ſtanding rain water or any other cauſe, the water muſt be drained off, otherwiſe Oaks, Aſhes and Beeches, will be injured in their growth, none of theſe trees agreeing with ſuch a ſituation.

Red Beech.

The Red Beech, which puts its leaves out very early, often ſuffers ſo much from late froſts as to go to decay in its top branches—At the ſame time, as this tree has a great many branches, if it happens

to ſtand alone and much expoſed, when a ſtrong wind comes, its roots, which do not run ſo deep as thoſe of the Oak, are very much diſturbed; and from thence its decay alſo frequently begins.—Its nouriſhment becoming inſufficient, it ſoon rots. Before this takes place, however, it muſt be cut, and made uſe of.

Theſe being the cautions to be obſerved reſpecting the prevention of the decay of the principal foreſt trees, in order to avoid prolixity, we ſhall paſs over others of an inferior rank, which are never left ſtanding above twenty or thirty years, and belong chiefly to Coppice Wood.

The beſt Situation for a Foreſt.

The greater or leſs expoſure of trees to heat and cold, from ſun and winds, but particularly cold winds, has a ſtrong influence upon their growth—The more warm and ſheltered they ſtand, indepen-

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dent of the quality of the ſoil, they in general thrive the better; heat being the great active principle of vegetation. It is on this account we find the trees in the middle of a foreſt, to be thoſe of the fineſt growth — Whenever therefore a fence or ſhelter can be had by nature or otherwiſe againſt cold winds, that ſituation ſhould be preferred, for the ſite of a Foreſt. And in this view alſo, the borders of the Foreſt on every ſide ſhould be planted, and always left ſtanding with thick wood—

CHAP.

CHAP. XXVII.

Of the Office and Duties of the Director of a Foreſt.

A DIRECTOR of a Foreſt, is the perſon to whom the whole management of it is entruſted.—In many countries of Europe, Colleges are eſtabliſhed, where inſtructions for the diſcharge of ſuch an office are given, and Noblemen as well as others reſort, in order to be tutored in that branch of agriculture to which it belongs.—

A careful Foreſt Maſter muſt frequently ſurvey the foreſt under his care in perſon. His general plans for the conduct and management of it, ought always to be made with ſo much foreſight as to leave him ſufficient time to prepare for the due execution of them. The timber to be cut,

cut, the encloſures to be made, the ground to be planted, and ſeed to be ſown, ſhould all be ordered in this manner. His ſeed of all kinds, at the ſame time, ſhould always be ready, that he may never depend one year on the contingencies of another. After his plans are fully arranged, and he has given orders for executing them, he muſt next be watchful that theſe orders are ſtrictly obeyed. He muſt be certain, that his workmen, ſuch as wood cutters, planters, and other labourers, do their buſineſs well. He muſt take care, that they receive their pay regularly, leſt it ſhould be embezzled by the deputies or ſervants under him; which might give them ſome pretence to commit frauds on the foreſt timber, and to neglect due attendance on their labour, while the other ſervants of the foreſt, on account of their own fraudulent conduct, are afraid to diſcloſe their malpractices.

The Director of a foreſt muſt alſo be cautious not to employ Foreſt-keepers under

der him, who do not underſtand their duty; and muſt take pains to inſtruct thoſe he does employ to the utmoſt of his power. Sober, ſtout, healthy people, are requiſite for his buſineſs, which requires attention in the night as well as in the day. On this account a ſufficient ſalary ſhould be allowed them that they may live comfortably and have no temptation to neglect or leave their employment, if they prove honeſt, or to conceal a robbery from their maſter, or a neglect of duty in his ſervants. Theſe precautions being taken, the Director of a foreſt may expect ſucceſs in his charge; but otherwiſe, all his plans are uſeleſs, and his foreſt will turn to waſte.

CHAP.

CHAP. XXVIII.

CONCLUSION.

HAVING in the preceding pages endeavoured to explain, from my own practice and experience, the rules which the Director of a foreſt ought to obſerve, in the execution of his duty, having mentioned the ſeaſons at which the ſeeds of different trees are ripe; the manner of gathering, preſerving, and ſowing each; the different ſoils which they require; the method of tranſplanting young trees from a nurſery into a foreſt, and of raiſing and treating Coppice Woods; the way in which grown timber ought to be cut and managed; having alſo ſhewn how waſte lands may be recovered and improved, by the culture of Firs upon them; and ſtated every other particular, within our knowledge, connected with the charge

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of a Foreſt-maſter; we wiſh it to be underſtood, that though the ſyſtem we have laid down for the management of foreſts, is founded on experience, and ſupported by the preſent practice of ſeveral countries of Europe, where that branch of agriculture is much ſtudied and encouraged, we are ſtill open to further improvements and information; by no means flattering ourſelves, that our ſyſtem is perfect, or liable to no objections. On the contrary, we are ſenſible, that many diſcoveries are yet to be made, from obſervation, in the principles of vegetation, which will greatly aſſiſt in the culture of foreſts. In the mean time, we hope we are juſtifiable in ſubmitting to the Public the rules of that practice which has hitherto been attended with the greateſt ſucceſs. This treatiſe, at the ſame time, is not to be conſidered as containing every particular rule and circumſtance of practice, which comes within the ſcope of ſo extenſive a ſubject, as the culture of foreſts

reſts and foreſt trees: to mention, or even advert but ſlightly to them all, would require a volume of immenſe bulk, which would be very foreign to the views propoſed by the author; but he hopes he has ſtated the general principles ſufficiently clearly to make them ſerve, in a great meaſure, as a guide to thoſe who would lay out foreſt grounds to advantage.

Having forgot to give a caution, in the preceding part of this work, reſpecting the cutting the roots of the Oak, we beg the Reader's indulgence for inſerting it here, rather than omit it altogether; it is—that the heart root ought not to be cut at all, unleſs to cut it ſmooth, if it ſhould be ſplit or broken, in being taken out of the nurſery, and that a part of the hole into which the tree is to be ſet, ſhould be deep enough to admit the whole length of that root. If a tree, however, ſhould have no heart root, or if that root ſhould be unſound, it is not worth planting. On a future occaſion, it

is the intention of the Author to enlarge this treatiſe, and illuſtrate it with plates: any miſtakes or inaccuracies, therefore, which may have eſcaped him, in his zeal to be expeditious in propoſing and pointing out a meaſure of public benefit to the attention of the Legiſlature, he hopes will be excuſed; any ſuch overſights cannot affect his general deſign, and are eaſily corrected in the execution of it.

APPENDIX.

Of the Royal Foreſts, Chaces, and Parks.

HAVING treated of the culture of foreſts in general, and explained the rules and methods of practice by which they are beſt managed and preſerved, we mean that a particular application of the principles we have laid down for that purpoſe ſhould be made to the improvement of the Royal Foreſts, Chaces, and Parks, in England.

The Royal Foreſts, Chaces, and Parks of this kingdom are ſo conſiderable in their extent, and ſo favoured in climate and ſoil, that with proper management they would be able to ſupply, not only all the demands of the Royal Navy, and the re-

pairs of all the Royal Buildings, but to allow enough from their produce for the expences of their further improvement, beſides the defraying of every annual contingency, including the draughts made upon the foreſt cheſt occaſionally by the Treaſury, even if theſe ſhould be greatly encreaſed in their amount.

Of the Royal Parks we cannot ſay that their condition, from various circumſtances, and in particular, from each being more immediately under the eye of a Ranger, who is always a perſon of the firſt rank and eſtimation, has ſuffered much neglect. Frauds have not been ſo eaſily committed upon them, and waſte thereby leſs frequently occaſioned.

The ſituation of the open foreſts, however, has been very different, and even ſo alarming, that in the year 1771, a Committee of the Houſe of Commons was appointed to examine their ſtate, and direct the means for the better ſupplying the Royal Navy with timber. But notwithſtanding the report of this Com-

Committee ſtated the ruinous condition of the foreſts, while at the ſame time, with reſpect to ſituation, they were poſſeſſed of every advantage and ſuperiority of ſoil fit for the growth of the fineſt timber of all kinds, yet the execution of the meaſures neceſſary for the object of their enquiry has ſtill been neglected and delayed.

Nothing can more ſtrongly picture the wretched and deſolate ſtate of the foreſts, which ſhould repreſent the ſtrength and ſinews of the country, than their being ſo naked and bare, even of buſh and underwood, that they cannot give ſhelter to deer; thoſe animals, as well as other game, having been conſequently obliged to leave them, and found ſtraggling through the country in ſearch of cover. The damage, at the ſame time, done to the foreſts by neglect of proper cultivation, has been greatly augmented, and material injury ſuſtained by them, from encroachments on their boundaries. But what is greatly more aſtoniſhing, it has been recently propoſed to ſell part of

the foreſt lands, inſtead of recovering their full extent and improving them. This meaſure ſeems to have no other object in view than the raiſing of a temporary ſum of money, without any conſideration of future exigencies, which the enlargement and proper culture of them might ſupply; not to mention the invaſion which it aims at of Royal domain. It would appear, in ſhort, from the preſent ſtate of the Royal Foreſts that their late Managers conceived there was timber enough in them for the demands of the preſent century, or at leaſt, during their time in office, and therefore neglected entirely their œconomy and improvement. A great quantity of timber is requiſite to ſupply the daily encreaſing demands for the Navy and the commerce of this country; beſides what is neceſſary for the purpoſes of inland navigation, which is every day advancing, and the canals for which make the tranſporting of timber convenient and eaſy: there are alſo many reaſons for preferring a ſupply of it from the foreſts of this kingdom.

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The ſoil and climate are particularly favourable to the growth of every ſort of wood; the Engliſh Oak eſpecially is reckoned the beſt in Europe: but beſides the ſuperiority of the wood of it and others, their growth is quicker; as the winters of this country are neither ſo ſevere nor laſting as thoſe on the Continent towards the north.

From the circumſtances above mentioned, it is evident, that if the intereſts of the nation are to be ſtudied, and poſterity regarded, the ſtate of the Royal Foreſts require the moſt ſerious attention; and it is indiſpenſably requiſite to adopt meaſures for their management and preſervation. In propoſing theſe, though I am ſolely actuated by duty, it will be impoſſible to avoid paſſing cenſure upon the miſconduct, miſmanagement, and ruinous neglect, which has occaſioned the neceſſity of them.

There are none but People of age, who have ſeen the foreſts of England in full growth, that is, in that thriving ſtate and preſervation in which they ought always

to be continued. The cauſes which have gradually reduced them all to a ſtate of almoſt waſte and ruin, and the rules which ſhould be obſerved for their preſervation, ſhall be contraſted with each other.

I. The open foreſts have been continually ſubject to robberies of their timber, for want of the neceſſary regulations to prevent them.

The ſervants of the foreſt, therefore, ought to be bound by oath, to watch and prevent any ſuch frauds from being committed, and if found in colluſion with any perſons committing them, to be ſeverely puniſhed as an example to others.

II. Unſkilful people are too often employed in the management of a foreſt.

To find perſons who are well qualified for the different employments in a foreſt, is the buſineſs of the Surveyor General and his Deputy.

III. Timber is often cut at improper ſeaſons of the year.

The Surveyor General and Deputy ſhould alſo prevent this.

IV. Little

IV. Little or no attention has been paid to diſtinguiſh wood fit for fuel, from wood fit for timber, that the laſt might be preſerved, and only the former cut; and alſo what parts of the ſame tree might be fit, the one for fuel, and the other for timber.

This is alſo in the judgement of the Surveyor General and Deputy, who ſhould ſuffer no wood to be cut, without their knowing the purpoſe to which it is to be applied.

V. In cutting timber, in particular amongſt young growth, a tree by falling upon them, or when it is brought away, often deſtroys more than its timber is worth.

The Surveyor General and Deputy muſt therefore judge, in ſuch caſes, of the propriety of cutting ſuch timber.

VI. When foreſt ſervants, Clergymen, or others, are entitled to fuel from a foreſt, they often by fraud obtain, inſtead of decayed trunks or branches, ſound and valuable timber, to the great prejudice of the foreſt.

In all caſes of ſuch privilege or right, it is adviſable to buy the right, by paying an equivalent in money for it out of the foreſt cheſt; but if this mode of compenſation ſhould be refuſed, great care muſt be taken to limit ſuch dues.

VII. If Surveyors from the Navy, &c. come with an order for timber, and are not carefully attended to, they are very apt to aſk for double the quantity of their order.

All ſuch orders, therefore, ſhould be in writing, and examined by the Foreſt Surveyor General or Deputy, who ſhould take care that their order is properly complied with, and not exceeded. The timber muſt be meaſured and cut, and what remains afterwards, if uſeful, laid up; if not, given away as fuel to thoſe who are entitled to it.

VIII. If the Surveyor of Public Works has a demand for timber for building, or repairing any Royal building or bridge, his demand often exceeds the neceſſary quantity in a great degree; the building for which

which the timber is granted, is ſometimes poſtponed, or never built; a plan for building ſuch a bridge of ſtone, is afterwards introduced, and the timber never accounted for: too ſtrict regulations, therefore, cannot be paſſed to guard againſt ſuch frauds and peculation.

Orders for ſuch, therefore, ſhould all be in writing, alſo eſtimates for what is neceſſary made out, and an exact meaſurement of the ſame given, and no more; as the remains of large wood, after being cut for ſuch purpoſes, are often uſeful to ſhip builders and others.

IX. Neither nurſeries for the ſupply of foreſt land with young trees, nor encloſures for the defence of young growth, have ever been properly made, and preſerved.

Theſe particulars alſo muſt be attended to by the Surveyor General and his Deputy, as they are indiſpenſably neceſſary to the welfare of the foreſt.

X. The

X. The privilege which the foreſt ſervants claim to what is called *top* and *lop* trees, gives the utmoſt opportunity of doing injury to the foreſt, as it is a pretext for endleſs frauds, which are often ſo very profitable as to make the foreſt ſervants frequently commit them, or to allow them to be done by others; the loſſes which the revenue ſuffers therefore muſt be in proportion. Oak and Beech, in particular, do not thrive after being cut in this manner; beſides that it often happens, that the branches of the Oak, on account of the largeneſs of its limbs, are uſeful for knee wood in ſhip building, and therefore more valuable than the tree itſelf. The effects of this ruinous practice are viſible in Epping, Windſor, New, Deane, and other foreſts; where the trees are ſtanding without head or limbs, unfit for any thing, but evidences of robbery and waſte; the ſmalleſt obſervation and compariſon with the eye, of the regular growth of timber in a park, or private property, where no ſuch baneful

baneful privilege is permitted, will be ſufficient to make its impropriety and injurious tendency appear.

This ſource of emolument or perquiſite to the foreſt ſervants, ought therefore to be entirely cut off from them, and a proportional encreaſe of ſalary allowed them; or if the perquiſite is to be at all granted, the White Beech is the only tree which ſhould be cut in this manner.

XI. No care has ever been taken to prevent encroachments on the boundaries of the foreſts; ſo that it has almoſt become cuſtomary to crib many acres from them, every here and there; until at laſt, great ſpaces of land have been detached, and cut off from them without any permiſſion from Government, or acknowledgment to the foreſt cheſt.

This ſhameful and growing evil muſt be ſtopped, by the vigilance of the Surveyor General, his Deputy, and his under ſervants; the latter of whom ought to be enjoined to make an inſtant report to them, under

under pain of diſmiſſion, of every attempt towards an encroachment on the foreſt.

XII. It has too often happened, that old family ſervants, or others equally unfit, have been appointed to the care of foreſts and parks, although totally ignorant of every thing belonging to their charge. Such ſituations being given them for the ſupport of their old age, in compenſation for paſt ſervices, they are ſtudious of nothing elſe than the means of relieving their infirmities, and comforting the decline of life. They are unable to diſcharge their duty, particularly in looking by day and by night, in all kinds of weather, after the ſafety of the foreſt; on which account, opportunities are never wanting to thoſe diſpoſed to rob and defraud it. Where there are any ſuch ſervants belonging to a foreſt, they ought to be otherwiſe provided for; and the Surveyor General or Deputy ſhould take care, that their places are inſtantly filled up with young and active people, intelligent

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in the buſineſs of the department and duty they undertake.

XIII. Due advertiſement has ſeldom or never been given to the public, in newſpapers, or in neighbouring churches, when timber, or other wood, has been to be ſold, in order that the beſt market price might be obtained for it, and that the poor as well as the rich, might ſupply themſelves with what they wanted on ſuch occaſions. Private contracts for the ſale of timber, too eaſily admit of the gratification of private views.

It is proper, therefore, that eight days previous to every ſale of timber, for whatever uſe it may ſerve, advertiſement of the ſame ſhould be given in the public newſpapers, and in the neighbouring churches, for the better information and convenience of every purchaſer, and for a fair and equitable ſale of the property of the King.

Having mentioned the different cauſes which have allowed the Royal Foreſts of England to ſink in their value, and grow

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ſcanty in their ſupply of timber for the uſes of the nation, to the great prejudice and reduction of the Royal revenues ariſing from them; and alſo ſhewn the means and precautions, which had they been taken, would have prevented ſuch conſequences, and grounds of complaint; I will humbly ſtate my idea of a proper foreſt eſtabliſhment, which upon being once firmly fixed, would ſoon evince its importance and advantages in the perpetual internal fund of wealth and ſtrength it would raiſe to the country. The due culture of foreſts is a foundation, on which an immenſe ſuperſtructure is to be raiſed. It requires, therefore, to be formed with ſufficient extent, ſolidity and circumſpection, and afterwards, the moſt induſtrious attention to all its members and parts.

The officers, ſervants, &c., conſidered neceſſary to this eſtabliſhment, are,

I. *A Surveyor General, who is the chief Director and Manager of the Foreſts, and ought to be a perſon of the firſt rank and fortune,*

tune, above the conſideration of the emoluments of his place, of influence ſufficient to give ſpirit and vigour to the execution of his orders, and attentive to cultivate all ſuch intereſts as are neceſſary for the diſpatch of buſineſs, and agreeable diſcharge of his office, particularly as the Rangers, who are all men of rank, have more or leſs interference with it.

II. A Deputy Surveyor General, who is not only to aſſiſt the Surveyor General in every part of his duty, but alſo to uſe his beſt endeavours to promote the general improvement of the foreſts, and in particular, to give relief and ſatisfaction to his ſuperior in the diſcharge of his office.

III. A Land Surveyor, who is to ſurvey all the Royal Foreſts ſucceſſively, and draw three plans of each, repreſenting the whole extent and boundaries of them ſeparately, the encroachments which have been made upon them, their diviſions and ſubdiviſions; together with the growth upon them. One of theſe three plans of each,

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to be preſented to the Treaſury, a ſecond to be kept in the Foreſt office; and the third to be reſerved for the Land Surveyor of the time being.

IV. A Timber Surveyor, who is well acquainted with the various uſes of timber, and particularly with ſhip timber, and can direct what is proper to be cut for different purpoſes and demands, ſo that no wood which would be uſeful for ſhip timber, or houſe timber, may be given for fuel, &c., but carefully laid up until it is wanted for the uſe it will beſt ſerve, and bring the beſt price.

V. A Planter, or a perſon who is to examine the culture of each foreſt ſucceſſively, and obſerve the execution of all the orders of the Surveyor General, that they may be done ſkilfully and without delay, and make a true report accordingly to the Surveyor General.

VI. A Meſſenger, who rides, or a perſon ready at all times to convey, with proper ſpeed,

ſpeed, on horſeback, the different orders of the Surveyor General or his Deputy.

VII. A Foot Meſſenger for the ſame purpoſe of tranſmitting orders, or meſſages, to ſmaller diſtances.

VIII. A ſeedſman, or a ſtrong active perſon, who underſtands the whole management of all different kinds of ſeeds, and takes care of them for the ſupply of the different foreſts when wanted.

IX. A houſe for the Foreſt Office, which muſt be detached from any other buildings, and ſtand alone, for the better ſecurity from fire; where not only all the foreſt buſineſs is to be done, but all books and papers belonging to it may be kept, and the magazine of ſeeds preſerved, from which all demands for ſeed, to the different foreſt grounds, are to be ſupplied.

X. A Solicitor, or Attorney at Law, of character and reputation, whoſe ſalary ſhould be ſo ſufficient as not to lay him under the neceſſity of attending to any

other buſineſs, for which he can have no leiſure or time, if he does juſtice to the affairs of the foreſt. The greateſt requiſites in his department moderation, and temper; his chief object being to reconcile all differences, and adjuſt diſputes amicably, without involving the King in vexatious ſuits with any of his ſubjects.

XI. A Treaſurer, who receives and pays all monies on account of the foreſts; who ſhould give ſecurity for his truſt, and ought to ſettle annually with the Treaſury, with the Surveyor General's atteſtation to all his accounts.

XII. A Secretary to the Surveyor General.

XIII. An Under Clerk.

As ſoon as this eſtabliſhment is reſolved upon, and the neceſſary officers appointed; the firſt ſtep to be taken is:

I. To have the foreſts ſurveyed by the Land Surveyor immediately, and his report made in the manner before mentioned.

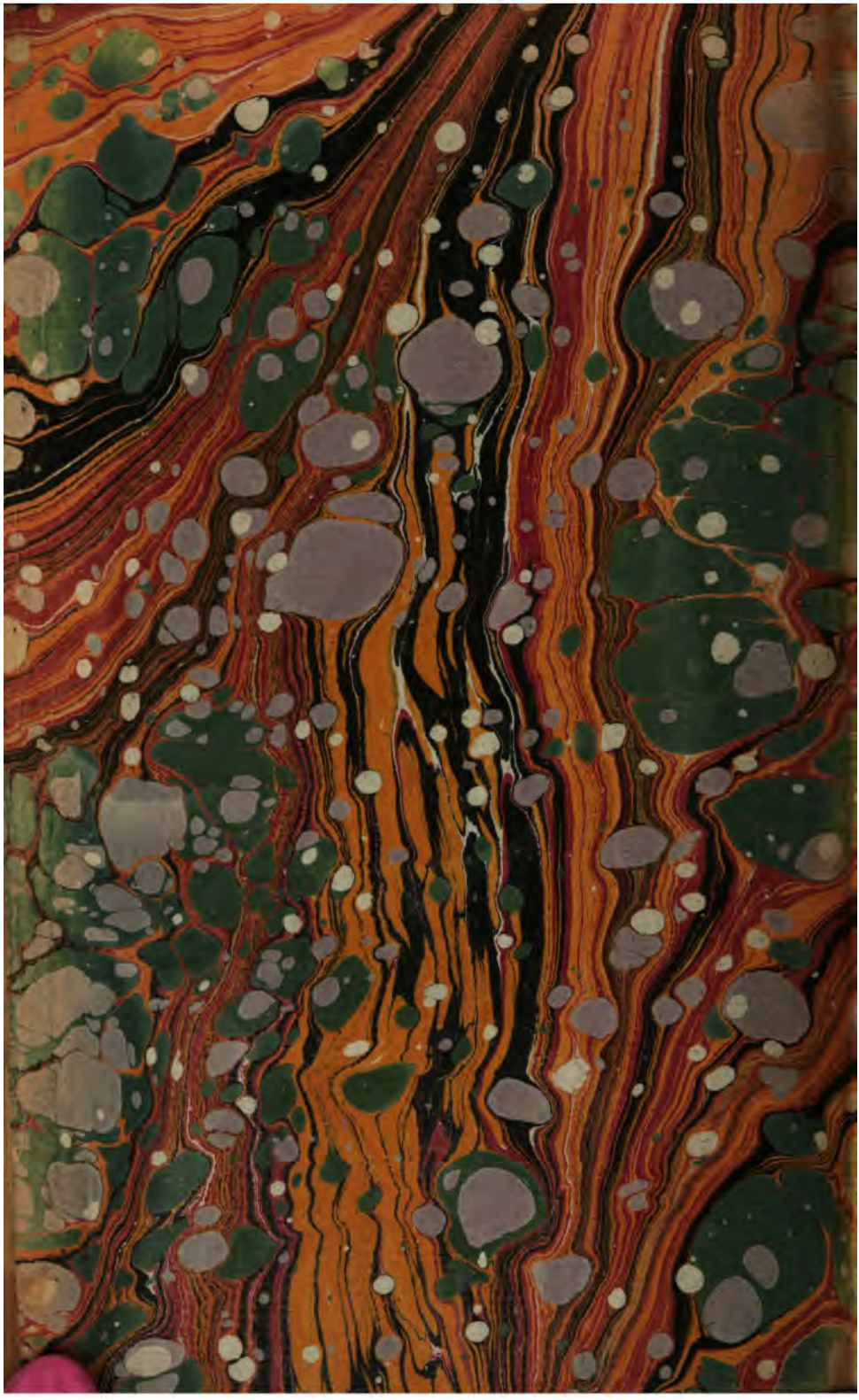
II. To order all the preſent foreſt ſervants to make a return of their offices, ſalaries, and perquiſites, of every kind.

III. To eſtabliſh correſpondences in Norway and other countries, for the ſupply of ſeeds, and particularly fir ſeeds, which are to be had better and cheaper there than in this country; it being dangerous to depend on the ſeed dealers here, for the reaſons before mentioned in this work.

IV. To form nurſeries for Oaks, of one, two, three, or more acres, in proportion to the extent of the park or foreſt, to which they may belong, and are to ſupply: and to begin with the parks.

V. To provide a foreſt hammer which ſhould be made of a new ſtamp, with the King's name, which is to be placed in the cuſtody of the Surveyor General or his Deputy, that no tree may be cut without being firſt marked with this hammer, and afterwards accounted for.

VI. The principal foreſt ſervant of every foreſt muſt alſo have a hammer for his



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